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ABSTRACT

This report examines and compares early career decisions, initial and 1981 employment, professional activities, and post-graduate education of new, non-traditional engineering graduates (women, Hispanics, Blacks) with their traditional peers. About one-half of the 6,000 surveys mailed to a sample of these engineering graduates (N=1720 men and 1080 women) were returned. Relatively few differences between male/female and minority/majority graduates were found in their initial/current employment, professional activities/achievement, and factors influencing career decisions. Technical responsibilities increased with experiences with no significant sex/ethnic differences. Men reported significantly higher supervisory responsibilities and salaries 10 years after graduating than women. The majority of all groups had pursued or were pursuing some post-bachelor's education, with women/Black-Americans leaning more toward graduate work in management than men/majority graduates. Work-related factors tended to be the most important factors influencing engineers' career decisions; female/minority graduates were more apt to cite a wider variety of factors than male/minority graduates. Men were more apt than women to cite relevant work experiences and hobbies as factors influencing their career decision. Engineers had relatively high self-perceptions. Men were more likely to assess their athletic, mechanical, and visualization abilities higher than women, but women rated their artistic, mathematical, and interpersonal-relations abilities higher than men. (Author/JN)

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THE NEW ENGINEER: BLACK AND WHITE, MALE AND FEMALE[1]*

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The engineering profession, like many other professions, has recently experienced an unprecedented growth in the number and proportion of women and underrepresented minorities (Black and Hispanic) who have entered and graduated from U.S. engineering colleges. This report examines and compares the early career decisions, initial and 1981 employment, professional activities and post-graduate education of these new non-traditional engineering graduates with their traditional peers.

METHOD AND DATA SOURCES

The data discussed in this paper was derived from the National Engineering Career Development Study sponsored by a RISE grant from NSF. Among the materials mailed to a sample of members of the major engineering societies and graduates of engineering schools was a comprehensive engineering career development survey. About one-half of the 6,000 surveys mailed were returned, with only minor differences in the response rates for men (52%) and women (57%). The primary sources of Black and Hispanic graduates were engineering institutions with relatively high numbers of minority graduates. However, the returns from these institutions were somewhat lower (31%) than were the returns from the engineering societies (55%).

Over 400 items were included in the final survey form which was pre-tested using survey forms of various lengths and using various follow-up procedures. Women and minorities were oversampled in order to provide adequate data for comparison purposes. This report is based on 1720 men and 1080 women, including 128 Black Americans, 133 Hispanic Americans, 2273 White Americans and 79 Foreign Nationals.

The resulting data base was then used to examine (1) initial and current employment factors, (2) professional activities, (3) educational level and attitudes, and (4) self-reports of factors influencing the career decisions of male and female and of minority and majority engineering graduates. Non-parametric statistics (primarily Chi-Square,) and some parametric methods (ANOV) were used to identify similarities and differences by sex and by ethnic background.

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RESULTS

Table 1 summarizes the primary background data on the survey sample. The Black and White subsamples were more likely to include women than were the Hispanic and Foreign National subsamples. The overall median age at the time of the survey (1981) was 28 years: 31 years for men and 27 for women; 28 years for Blacks, 27 years for Hispanics, 28 years for Whites and 29 years for Foreign Nationals. These data indicate that there is some confounding of sex with age and experience, but that this is rather minimal for ethnic comparisons, although women are somewhat over-represented among White Americans. Relatively few differences between male and female and between minority and majority engineering graduates were found in their initial and current (1981) employment, professional activities, educational and demographic characteristics and the factors influencing their career decisions, when experience or year of BS degree were controlled. Thus, it appeared that male and female engineers tend to have more in common with each other than they have differences with respect to the factors studied. Majority and minority engineers also tended to be similar. However, some differences were observed, and the remainder of this paper focuses on these differences.

Two previous papers have been based on the data base collected from this national sample, but they were limited to recent graduates less than 5 years experience, (Jagacinski et al., 1982; LeBold et al., 1982). Two other papers were based on a sample of Purdue engineering graduates (Jagacinski & LeBold, 1981; LeBold & Jagacinski, 1981) matched by year of BS and field of engineering. In all four papers, we have observed relatively few sex differences. However, there have been some data, from these and other sources (McAfee, 1981) which indicate that, although recent male and female graduates are relatively similar in the education, initial employment and professional activities, there are some significant differences among male and female graduates with more experience (10 or more years). In this exploratory paper, we will examine some of these similarities and differences. However the experiential comparisons will be limited to the male and female sub-samples, because the number of ethnic minorities is small and, as previously noted, the age differences are minimal.

Table 2 indicates that the employment status type of employment, and functional responsibilities of male and female and ethnic minority and majority graduates are relatively similar. However, the data does suggest that there are slightly higher unemployment rates among Black and Foreign National graduates and that Black graduates are a little more likely to be employed full-time in non-engineering areas than are White graduates (22% vs. 10%). Male graduates are more likely to be employed in technical management than are females (18% vs. 11%). However, in one previous paper based on graduates with less than five years experience, we found no sex difference, (7% male vs. 9% female) in management responsibilities (Jagacinski et al., 1982). In another paper based only on recent mechanical and electrical engineers, we found small but significant interaction effects, with electrical engineering men being more likely to be in management (16% vs. 6%). However, mechanical engineering women are more likely (8% vs. 14%) to be in management than are their male counterparts or peers (LeBold et al., 1982). These two studies, however, found no significant difference in the technical responsibility level or the technical-administrative mix of recent male and female engineering graduates.

In order provide further insight into this complex matter, and because data are available on over 1000 female and over 1700 male engineering graduates, technical

and supervisory responsibilities and current (1981) salaries were examined. Figure 1 indicates that the percentage of male and female graduates having relatively high technical (Levels 6-8) responsibilities,[2] that increases with experience (years since the BS degree), with no significant statistical or practical sex differences for each level of experience. On the other hand, as may be noted in Figure 2, when supervisory responsibilities were examined, there was no practical or statistically significant difference between male and female graduates during the first five years. After ten years, however, the sex differences are practical and statistically significant, with over half of the men, but somewhat less than half of the women, supervising professional or managerial personnel. These results are also reflected in the salaries of male and female engineering graduates. Figure 3 indicates relatively small salary differences for those with less than 10 years experience. However highly significant salary differences were observed for engineers with more than 10 years experience, with men reporting about 25%, or $5000, higher annual salaries than women with comparable experience. Whether or not these differences will persist in the future as new engineers become more experienced is a matter of speculation and conjecture. The authors believe these differences will be dependent upon a number of factors, including willingness of peers and management to provide women engineers with supervisory experience and their collective and individual track records when given such opportunities. Supporting data included in this paper and other studies would indicate that women should have high potential for becoming managers in view of their communication skills and sensitivity to human needs.

Table 3 indicates that there are some small but significant sex and ethnic differences in the professional activities of graduate engineers. Males and Foreign Nationals were more likely than others to read and purchase new engineering books, attend national meetings, present papers, and publish articles. However, the latter sex differences may be due to the fact that women were younger and not as likely to have had sufficient experience. Women and Foreign Nationals are more likely than their peers to subscribe to engineering periodicals, to take graduate engineering courses and to become a member of two or more national societies.

Table 4 indicates that small but significant sex and ethnic differences were observed in job satisfaction, with men and White graduates being more satisfied with their occupation and employment than are women and ethnic minorities. However, the majority of all groups reported generally high satisfaction with their employment and occupation.

Table 5 indicates that there are statistically significant sex and ethnic differences in the current and planned educational levels of engineering graduates. Except for Hispanic Americans, the majority of all groups had pursued or are pursuing some post-BS degree education and the overwhelming majority (75% or more) planned additional education. However, the type of graduate work planned varied across groups; with women and Black Americans leaning more towards graduate work in management and men and Foreign Nationals, leaning toward engineering-oriented graduate work and training.

2. An eight point scale ranging from simple-routine work with no experience (Level 1) to complex tasks requiring thorough knowledge (Level 6) through pioneering work requiring outstanding knowledge (Level 8) was used.

Table 6 indicates that males and Black-Americans were more likely than others to have first considered engineering and made a final decision on engineering as a career during or before the first two years of high school. Table 7 provides some further insight into the factors that influence the career decisions of engineers. Note that the "work"-related factors tend to be the most important factors followed, by "school", "people", and "activity" factors. Some interesting sex differences were also observed, with women being more likely than men to cite challenge, independence, college teachers, mothers, female engineers and computers as being important. In contrast, men were more likely than women to report the importance of relevant work experiences, construction and mechanical hobbies, building electrical devices and model airplanes, farm experiences, hobby magazines and flying aircraft. There were also some ethnic differences observed, notably the importance of science fiction, science fairs, science clubs, and building electrical devices and model airplanes among Black Americans and the importance of technical publications, science fair, science clubs, and junior achievement among Foreign Nationals.

In spite of the similarities in the career and employment patterns of male and female engineers and minority and majority engineering graduates, each group perceived the other's "grass as being greener" as far as opportunities in engineering were concerned. The majority (80%) of Black American engineers indicated that Whites had better or equal engineering opportunities, but the majority (67%) of White engineers believed either that opportunities were equal or that minorities had better opportunities. A significant majority (73%) of the women engineers indicated that men had equal or better engineering opportunities than women, in contrast to smaller male majority (60%) who had a similar perception.

A final area of interest were the self-perceptions of engineering graduates. Three major sources were used (1) some of the self-perception items used by Astin (1980) and his colleagues in the ACE studies of college freshmen, (2) Spence and Heimlichs (1978) studies of androgyny (viz instrumentality and expressiveness), and (3) Hollands (1973) theory of career types (realistic, investigative, artistic, social, enterprising, and conventional). When graduates were asked to give their self-perceptions of their abilities and interests, all groups had high self-images. Male graduates were more likely than female graduates to assess their athletic ability, mechanical ability, spatial visualization, originality and intellectual self-confidence as above average. Men were also more likely than women to assess themselves as being instrumental, realistic, enterprising and conventional. On the other hand, women were more likely than men to rate their mathematical and artistic abilities and their understanding of others as above average. Women were also more likely than men to assess themselves as expressive and having artistic and social-helping interests. These factors are examined in further detail in our other papers including a 1982 APA paper (Jagacinski et al., 1982), in two other AERA papers (Jagacinski et al., 1983; Shell et al., 1983) and in our forthcoming final report to NSF (LeBold, Linden, Jagacinski, & Shell, 1983).

This brief paper does not permit an exhaustive treatment of the data collected in this extensive survey. We are also hopeful of obtaining continuing support to analyze this rich source of data that includes over 2.5 million items of information.

CONCLUSIONS AND RECOMMENDATIONS

After many years in which male and white majority students and graduates have dominated engineering education and the engineering profession, there has been a very rapid increase in the number and proportion of women, Black Americans and Hispanic Americans entering the field. The new non-traditional students and professionals are receiving initial and subsequent employment opportunities and rewards similar to those of their male and majority peers. These women and minority engineers are also assuming similar professional responsibilities, and they are pursuing and planning graduate and continuing education programs similar to those of the male and majority graduates.

Some important similarities and differences were observed in the timing and factors that have influenced the career decisions of these new non-traditional graduates. The dominant theme is one of a dedicated and work-oriented constituency that should complement the traditional male and white majority group which have characterized engineering education and the engineering profession in the past.

In spite of these important equity gains, there are important differences in the perceptions and realities of career opportunities for women and minorities in engineering and other professions. These gains not only call for improved communications and research but also for action within engineering education and the engineering profession in particular, as well as education and professions in general.

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TABLE 1
Background Information on the Sample Group

	TO-TAL	SEX MA	SEX FE		ETHNICITY BL	ETHNICITY HI	ETHNICITY WH	ETHNICITY FN	
1. Sex									
1. Male	63%	100%	0%	5	74%	83%	60%	87%	5
2. Female	37	0	100		26	17	40	13	
2. Race or Ethnic identification									
1. American Indian	0%*	0%*	0%*	5	0%	0%	0%	0%	5
2. Asian or Pacific Islander	4	5	3		0	0	0	49	
3. American Black	5	6	3		100	0	0	4	
4. Mexican American	2	3	1		0	49	0	1	
5. Puerto Rican	*	*	*		0	6	0	0	
6. American Cuban	1	2	*		0	23	0	3	
7. Other Hispanic	2	2	1		0	22	0	16	
8. White, Not Hispanic	84	80	90		0	0	100	19	
9. Other	1	2	1		0	0	0	9	
3. Citizenship									
1. U.S. Native-born	91%	88%	95%	5	98%	67%	98%	0%	5
2. U.S. Naturalized	5	7	3		2	33	2	0	
3. Foreign National	4	5	1		0	0	0	100	
4. Year of Birth (Age of respondent)									
1. 1901 to 1934 (46 or older)	10%	14%	3%	5	6%	2%	11%	1%	5
2. 1935 to 1945 (36 to 45)	14	17	9		9	6	14	16	
3. 1946 to 1950 (31 to 35)	17	20	12		27	28	16	28	
4. 1951 to 1955 (26 to 30)	33	32	33		34	31	33	43	
5. 1956 to 1960 (20 to 25)	26	16	43		24	33	27	13	
5. Marital Status									
1. Single	33%	26%	43%	5	41%	40%	32%	35%	2
2. Married now	62	70	49		48	57	63	63	
3. Separated, Divorced	5	4	7		11	2	5	3	
4. Widowed	*	*	*		0	1	*	0	
6. Total Number of Children									
1. 0	52%	39%	76%	5	42%	44%	53%	51%	3
2. 1	15	18	11		32	18	14	22	
3. 2	19	26	7		15	22	19	24	
4. 3 or more	14	18	6		11	16	14	4	
7. (No. of cases)	(2739)	(1080)			(133)		(79)		
"		(1720)			(128)		(2273)		

* is less than .5%

[1]p<.05, [2]p<.01, [3]p<.001, [4]p<.0001, [5]p<.00001

TABLE 2
Employment Status, Type of Employer, & Job Function
for Present Job by Sex & Ethnicity

	TO-	SEX		ETHNICITY			
1. Your present employment status:	TAL	MA	FE	BL	HI	WH	FN
1. Not employed/not seeking	1%	*%	1%[3]	0%	0%	1%	0%[5]
2. Not employed/seeking engr	1	1	1	3	2	1	6
3. Not employed/seek non-engr	*	*	*	1	0	*	*
4. Employed part-time in engr	2	1	2	1	0	1	9
5. Employed part time/non-engr	*	*	*	1	0	*	0
6. Employed full time/engr	81	80	82	69	79	81	79
7. Employed full time/non-engr	10	10	10	22	9	10	3
8. Self-employed, engineer	2	2	1	0	2	2	1
9. Self-employed, non-engr	1	2	1	1	3	1	0
10. Retired from engineering	1	1	*	0	0	1	0
11. Retired from non-engr	*	*	*	0	0	*	0
12. Other	3	3	3	3	5	3	3
2. Type of Employer							
1. Manufacturing	48%	42%	45%	49%	36%	45%	45%
2. Other Private Business	30	40	40	32	42	40	40
3. Government & Health Services	12	11	13	15	21	10	0
4. Educational Institutions	5	7	4	4	2	5	17
3. Principal Function							
11. Pre-Professional	2%	1%	3%[5]	0%	7%	2%	0%[5]
12. Research	9	9	8	5	2	9	22
13. Development	11	10	13	10	7	11	14
14. Design	20	21	20	27	20	20	18
15. Operations	7	6	8	3	7	7	4
16. Production & maintenance	7	6	7	8	6	7	5
17. Testing & inspection	3	2	3	3	10	2	1
18. Construction	4	4	3	1	9	4	3
19. Sales & service	3	4	2	3	5	3	0
20. Teaching	3	3	2	6	1	3	8
21. Technical management	16	18	11	15	12	16	13
22. Non-technical management	3	4	3	8	4	3	0
23. Consulting	7	8	8	1	3	8	9
24. Other	7	6	9	10	5	7	4

* is less than .5%

[1]p<.05, [2]p<.01, [3]p<.001, [4]p<.0001, [5]p<.00001

TABLE 3
Professional Activities of Survey Respondents

1-11. Engaging in each activity during the past year	TOTAL	SEX			ETHNICITY				
		MA	FE		BL	HI	WH	FN	
1. Discuss new engr developments	68%	69%	66%		62%	60%	69%	62%	1
2. Read about new engr developments	79	79	79		83	80	79	88	
3. Subscribe to engr periodicals	79	78	82	2	66	71	81	84	5
4. Read new books on engr or sci	40	44	34	5	44	42	39	55	1
5. Purchased new books on engr/sci	40	43	35	4	44	41	38	65	5
6. Attended local technical meetings	46	46	47		36	39	47	54	1
7. Took non-grad credit engr course	16	15	16		18	14	15	24	
8. Completed grad courses in engr	15	13	17	2	23	17	14	33	5
9. Attended national tech meeting	28	30	24	2	20	13	29	37	5
10. Presented one or more tech papers	11	13	8	5	5	6	12	18	2
11. Attended short course on mgmt	28	27	30		35	26	28	23	
12. Professional Registration									
1. Registered Professional Engineer	14%	20%	5%		5%	10%	15%	19%	5
2. Registered Engineer in Training	34	30	40		16	29	37	15	
3. Not a Registered Engineer	52	50	55		79	61	48	66	
13. Number of National Societies									
1. None	4%	4%	5%	1	19%	12%	3%	5%	5
2. 1	43	45	39		33	48	43	36	
3. 2 or more	53	51	56		48	40	53	59	
14. One or more Articles Published	31%	37%	21%	5	21%	18%	33%	51%	2
15. One or more Books Published	3%	4%	2%		0%	1%	4%	2%	
16. Applied for one or more Patents	12%	16%	5%		12%	6%	12%	10%	
17. One or more Patents Granted	6%	9%	2%		5%	5%	7%	3%	

$^{1}p<.05$, $^{2}p<.01$, $^{3}p<.001$, $^{4}p<.0001$, $^{5}p<.00001$

TABLE 4
Satisfaction With Career Choice, Career Progress And Work

	TO-TAL	SEX			ETHNICITY				
		MA	FE		BL	HI	WH	FN	
1. How satisfied are you with your choice of occupation?									
1. Still uncertain	1%	1%	2%	[2]	1%	2%	1%	4%	
2. Not satisfied; reconsidering	5	4	7		10	5	5	8	
3. Satisfied, some doubts	21	20	24		22	26	21	25	
4. Made best choice	47	48	45		44	44	48	46	
5. Fully satisfied	25	26	23		23	24	26	18	
2. How satisfied are you with your progress in your occupation?									
1. Not satisfied	15%	13%	18%	[5]	28%	15%	14%	19%	[2]
2. Fairly satisfied	24	22	28		22	23	24	29	
3. Feel I'm doing well	45	46	41		38	49	45	38	
4. Fully satisfied	16	18	13		12	13	17	14	
3. General level of satisfaction with work in present job.									
1. Very satisfied	30%	33%	26%	[5]	20%	28%	31%	17%	[5]
2. Satisfied	50	51	49		46	52	50	63	
3. Neutral	14	12	15		20	15	13	13	
4. Dissatisfied	5	4	7		7	2	5	6	
5. Very dissatisfied	1	1	2		7	3	1	1	

[1] $p<.05$, [2] $p<.01$, [3] $p<.001$, [4] $p<.0001$, [5] $p<.00001$

TABLE 5
Current and Planned Education of Survey Respondents
and Attitudes Toward Graduate Work

	TO-TAL	SEX			ETHNICITY				
		MA	FE	5	BL	HI	WH	FN	5
1. Current Educational level									
11. No degree	1%	1%	*		1%	0%	1%	0%	
12. Bachelor's/no grad work	35	33	39		36	56	35	9	
13. Bachelor's/some non-engr grad work	16	14	18		27	22	15	8	
14. Bachelor's/some engr grad work	5	4	6		3	1	5	3	
15. Master's in engr	25	27	21		16	13	25	54	
16. Master's in business admin	5	6	4		1	2	6	4	
17. Master's in other non-engr	3	3	3		5	0	3	3	
18. Master's in engr and another field	2	2	2		2	0	2	3	
19. Doctorate, engr	5	6	2		0	1	4	14	
20. Doctorate, non-engr	1	1	1		2	0	1	0	
21. Other	3	3	5		7	6	3	4	
2. Planned Educational Level									
11. None	19%	24%	10%	5	4%	14%	20%	19%	5
12. Some grad work in engr	20	21	18		14	15	21	14	
13. Some grad work in non-engr	12	13	10		16	13	12	9	
14. Master's in engr	12	10	15		11	20	12	6	
15. Master's in management	20	17	26		30	23	20	17	
16. Master's in non-engr	2	1	3		0	2	2	3	
17. Master's in engr and another field	4	2	6		3	5	4	1	
18. Doctorate in engr	7	7	6		8	2	6	19	
19. Doctorate in non-engr	2	2	2		3	0	2	4	
20. Other	4	4	4		9	6	3	8	
3. Preferred Graduate Program									
1. Design oriented engr program	21%	22%	19%	1	21%	29%	20%	20%	1
2. Research oriented engr program	17	17	17		13	11	17	29	
3. Management oriented program	56	56	56		59	57	56	46	
4. Other	6	5	7		7	2	6	5	
4. "Strongly agree" or "agree" with statement									
1. Graduate study is not needed	59%	59%	59%		60%	61%	59%	42%	1
2. "On Job" training is sufficient	47	47	46		57	55	46	32	2
3. Non-credit courses are sufficient	56	56	56		51	46	57	59	
4. Management Graduate work is needed	50	49	51		49	60	50	47	
5. Math & Sci Graduate work is needed	31	32	30		30	30	30	47	1
6. Engineering Graduate work is needed	47	48	46		41	47	46	74	5

* is less than .5%

$^{1}p<.05$, $^{2}p<.01$, $^{3}p<.001$, $^{4}p<.0001$, $^{5}p<.00001$

TABLE 6
Time of First Consideration and Final
Decision of an Engineering Career

	TO-TAL	SEX			ETHNICITY				
		MA	FE		BL	HI	WH	FN	
1. First Consideration									
1. Before High school	18%	22%	11%	[5]	32%	18%	17%	20%	[2]
2. During grades 9 or 10	19	23	12		14	24	18	18	
3. During grades 11 or 12	39	38	41		33	42	40	36	
4. During first year of college	11	10	14		15	13	11	9	
5. During second year of college	5	3	9		3	2	6	5	
6. During 3rd or 4th year of college	3	2	5		1	1	4	8	
7. After college	5	2	8		3	1	5	4	
2. Final Decision									
1. Before High school	4%	5%	2%	[5]	14%	5%	3%	9%	[5]
2. During grades 9 or 10	6	8	3		14	9	6	4	
3. During grades 11 or 12	43	48	34		44	46	43	42	
4. During first year of college	19	18	21		10	28	19	20	
5. During second year of college	12	10	17		11	9	13	7	
6. During 3rd or 4th year of college	7	5	10		5	3	7	10	
7. After college	9	6	12		2	0	9	9	

[1] $p<.05$, [2] $p<.01$, [3] $p<.001$, [4] $p<.0001$, [5] $p<.00001$

TABLE 7

Percentage of Respondents Rating the Following Factors as of "Very" or "Some" Importance in Influencing Their Decision to Study Engineering

	TO-	SEX			ETHNICITY				
	TAL	MA	FE		BL	HI	WH	FN	
1. Work Related Factors									
30. Liking for problem solving	85%	84%	88%	2	85%	82%	86%	83%	
42. Challenge	83	81	89	5	83	87	84	90	
31. Being curious or creative	83	83	82		88	82	82	84	
43. Salary	75	74	77		82	72	75	73	
44. Creativity	74	73	76		75	74	74	86	
49. Independence	68	62	78	5	70	73	68	73	
41. Type of work	64	63	65		53	58	65	58	1
46. Prestige	62	62	63		58	72	61	73	1
45. Security	61	59	64	2	64	64	61	68	
48. Leadership	56	54	60	2	57	69	55	70	2
22. Relevant work experience	42	46	36	5	44	36	42	35	
47. Rapid advancement	48	45	53	3	53	61	46	62	3
32. Wanting to be of service to others	45	44	46		47	49	43	59	4
2. School Related Factors									
18. College engineering courses	75%	74%	76%	1	80%	79%	74%	79%	
13. High School science courses	69	71	66		80	69	69	69	
12. High School math courses	67	66	68		79	71	66	69	1
21. Career or occupational information	57	57	58		66	67	56	57	1
14. College math courses	55	53	59	2	66	66	53	62	2
17. College science courses	50	52	47	1	60	63	49	60	3
16. College physics courses	48	49	46		61	62	46	54	4
20. Aptitude tests	45	45	45		47	39	46	40	
15. College chemistry courses	35	37	33		51	41	34	45	3
19. Interest inventory results	24	25	23		25	16	25	21	
11. Career education courses	17	19	14	2	30	25	16	17	4
40. Pre-college seminars	10	8	12	3	20	12	9	8	3
3. People Related Factors									
2. Father (or male guardian)	61%	60%	61%		50%	59%	62%	58%	
5. H.S. math or science teachers	48	49	47		53	48	48	57	
6. College teacher(s)	44	41	50	5	44	44	44	49	
1. Mother (or female guardian)	44	41	49	4	52	46	44	38	
4. Friends	36	37	34		41	35	35	49	
8. Male engineer(s)	32	32	32		26	37	31	43	
3. Other relative	27	27	27		30	38	25	41	3
10. High School counselor(s)	22	24	18	2	37	19	22	6	
7. College counselor(s)	22	21	26	2	34	31	21	26	3
9. Female engineer(s)	8	4	15	5	11	10	8	6	
4. Activity Related Factors									
34. Using a computer	32%	28%	39%	5	42%	42%	31%	39%	2
37. Construction hobbies	31	40	16	5	40	39	30	32	1
36. Mechanical hobby	29	40	12	5	40	36	28	43	3
29. Science Fiction	23	24	20	1	39	33	21	30	5
24. Technical publications	21	25	14	5	28	27	18	43	5
35. Building electrical devices	20	26	12	5	48	28	18	32	5
26. Outdoor activities	19	21	17	1	19	22	19	22	
38. Building model airplanes	18	26	5	5	31	26	16	30	5
25. Science Fair participation	16	18	12	3	30	12	14	32	5
39. Farm Experiences	15	20	8	5	11	18	15	11	
23. Hobby Magazines(eg Pop. Mechanics)	15	22	4	5	27	17	14	23	3
33. Flying aircraft	12	14	8	5	20	17	10	15	3
27. Science Clubs	12	13	11		25	10	11	23	5
28. Junior Achievement	4	5	3		11	7	3	17	5

[1] $p<.05$, [2] $p<.01$, [3] $p<.001$, [4] $p<.0001$, [5] $p<.00001$

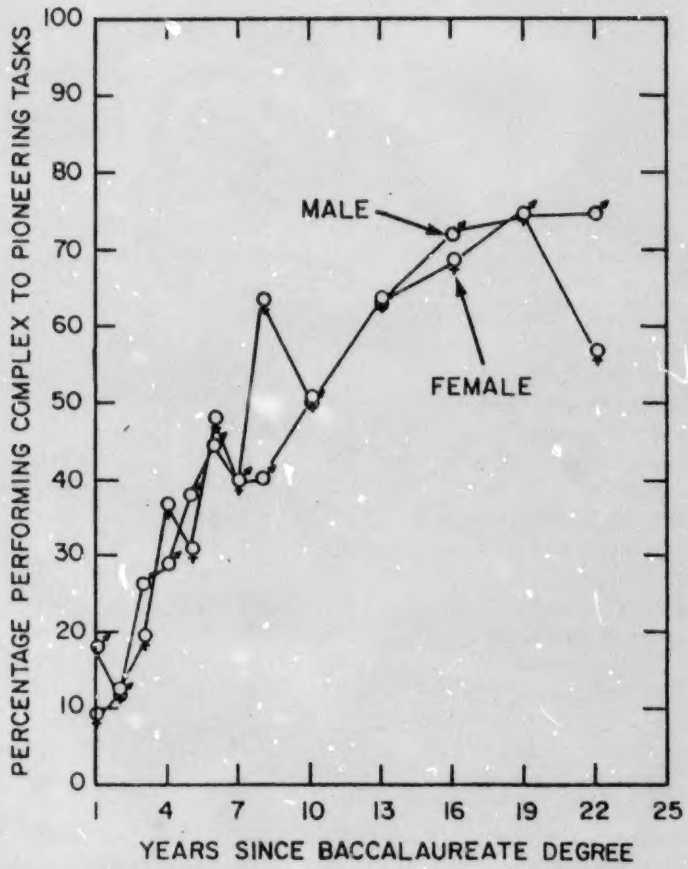

Figure 1 Percentage of Men and Women Engineers Reporting High Technical Responsibility (viz., Complex to Pioneering Work) by Years Since BS Degree.

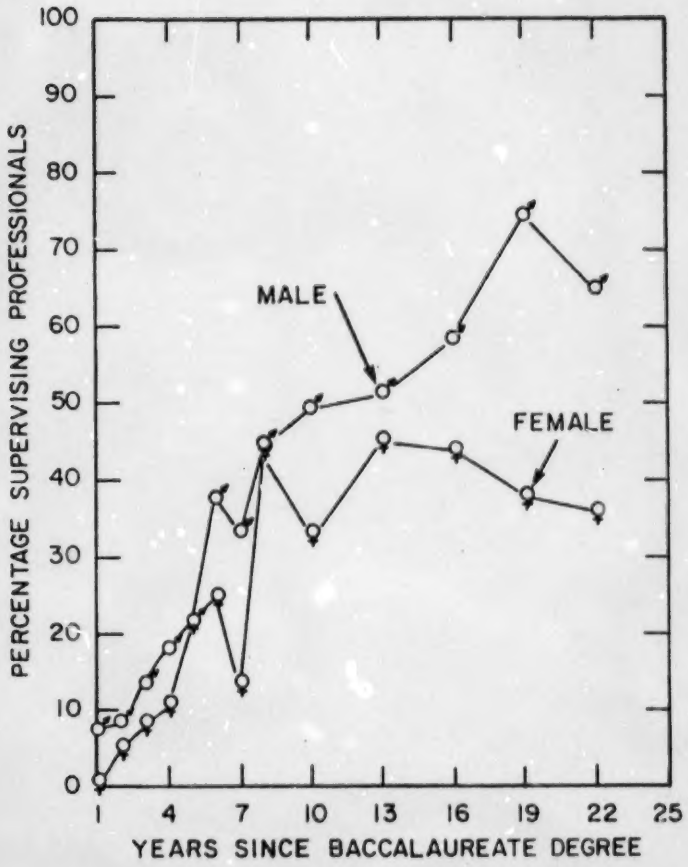

Figure 2 Percentage of Men and Women Engineers Supervising Professional or Managerial Personnel by Years Since BS Degree.

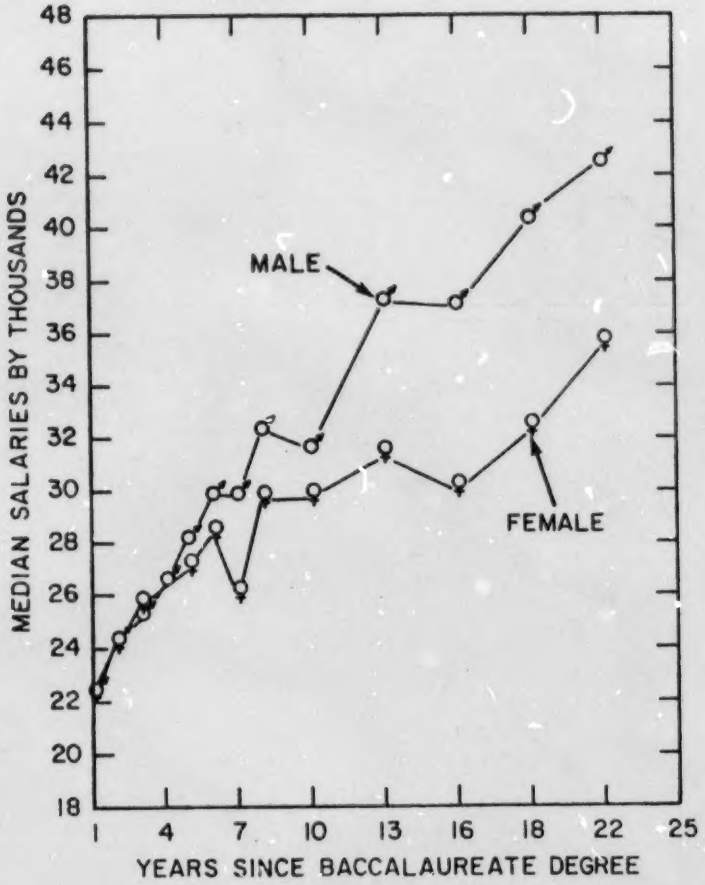

Figure 3 Median Salaries in Thousands of Dollars for Men and Women Engineers by Years Since BS Degree.